



**Wisconsin Highway Research Program
Request for Proposal for**

Reflective Cracking between Precast Prestressed Box Girders

**Questions regarding the content of this RFP are due no later than
4:30 PM (CST), Monday, December 10, 2012**

**Responses to questions will be posted to the WisDOT Research and Library website
(<http://wisdotresearch.wi.gov/rfps-and-proposals>) by
4:30 PM (CST), Monday, December 17, 2012**

**Proposers must submit an electronic version of a proposal (Adobe PDF required) by
4:30 PM (CST), Friday, January 25, 2013
to apakes@sustainability.wisc.edu**

**For further information regarding this RFP contact:
Angela Pakes Ahlman
email: apakes@sustainability.wisc.edu**

Researcher Questions on RFP

Please refer all questions on this RFP to the WHRP Technical Director, Angela Pakes Ahlman by the aforementioned due date. Questions must be in writing. No response will be provided to questions received after the due date.

Researcher Proposal Preparation Guidelines

WHRP Proposal Guidelines are available on the WisDOT Research and Library website (<http://wisdotresearch.wi.gov/wp-content/uploads/WHRP-RFP-Guidelines-11-26-12.pdf>). Please refer to these instructions in preparation of your response.



I. Background and Problem Statement

Precast Prestressed box girders have the potential of satisfying the need in Wisconsin for low profile super structures of short to medium span lengths. This type of superstructure also may serve to facilitate rapid or accelerated bridge construction (ABC). However, reflective cracking in the concrete overlay above the grouted joints between panels of prestressed box girders have historically presented a maintenance concern that has resulted in limited use of this superstructure type in Wisconsin. Once reflective cracking has occurred, intrusion of moisture and chlorides between the panels results in high vulnerability to deterioration without the ability to easily inspect and monitor those areas. The ability to prevent differential movement of adjacent panels and the resulting reflective cracking would prevent chlorides from infiltrating between panels and causing deterioration.

II. Objectives

The objective of this proposed research is to identify modifications to the current details, specifications, and methods used in Wisconsin related to Precast Prestressed Box Girder joint details and post-tensioned, grouted system that will prevent reflective cracking between the panels.

The investigation should include the following:

- Survey WisDOT regional bridge maintenance engineers, Industry Fabricators, and other State DOT's to identify extent and consistency of this problem.
- Review of national efforts related to this area including:
 - NCHRP Synthesis Report 393 on State Practices related to Adjacent Concrete Box Beam Bridges: Connection Details “.
 - NCHRP Project 12-95 “*Design Guidelines for Connection Details of Adjacent Precast Concrete Box Beam Bridges*”
 - Trade journals, publications, and past and present research, and other sources.
- Review past applications of this structure type in Wisconsin including visiting sites to make observations and measurements.
- Make recommendations for improved Policies, design detailing, specifications, and construction inspection related to the use of Precast Prestressed Box Girders.
- Working with WisDOT Bureau of Structures, Identify candidate Precast Box Girder test structures for new details to be incorporated in the design. Support inclusion of details and develop a 12 month monitoring plan that will document performance of updated practices.

III. Scope of Work

- a) Phase 1 (Completed 6 months from notice to proceed)
 - Conduct a literature review to obtain information on other research projects addressing this issue, as well as specifications outside of WisDOT.
 - Contact WisDOT engineers, contractors, consultants, State DOT's, and national sources to obtain information regarding policies, details, specifications, and performance history.



- Perform field reviews at existing sites with and without problems to make observations.
 - Review and make recommendations to update WisDOT's Bridge Manual, Bridge Standards, Construction and Materials Manual, and Standardized Special Provisions (STSP's) for Prestressed Box girders.
- b) Phase 2 (Begin after completion of Phase 1 and authorization to proceed to Phase 2)
- Work with WisDOT Bureau of Structures and Regional Offices to identify a pilot project to implement revised details and specifications in actual construction project.
 - Document design, fabrication and construction process.
 - Monitor construction and performance of Concrete Box Girder Structure for 12 month period and develop a plan for WisDOT monitoring after this period.
- c) Develop final report documenting revised policies, details, specifications, and performance of test site.
- d) Travel will be required to visit sites (on-going construction and completed), to meet with WisDOT Bureau of Structures as needed, and to present the report.
- e) Project Deliverables
- Phase 1 report with detailed discussion and exhibits summarizing literatures review, survey of DOT's and practitioners, and field observations of existing structures regarding policies, details, specifications, and performance history.
 - Phase 1 recommendation to update WisDOT's Bridge Manual, Bridge Standards, Construction and Materials Manual, and Standardized Special Provisions (STSP's) for Prestressed Box girders.
 - Phase 2 proposed Work Plan on installation and monitoring of Pilot Project structure with integration of details and provisions identified in Phase 1
 - Monitoring and documentation of Phase 2 Pilot Project.
 - Final Report including Phase 1 information, fabrication, construction, and performance results identified and measured in phase 2.

IV. WisDOT/TOC Contribution

- a) The WHRP Structures TOC will provide review and comments on findings as well as comments and guidance to work plans.
- b) The Department will work with Researcher to identify structure for Phase 2 Pilot Project. The Department will incorporate the recommendation and details identified in Phase 1 into a Pilot Project Administered by the Department.
- c) Access to Department Manuals, Standards, and existing structure information

V. Other Project Requirements

- i. None.



VI. Budget and Time Frame

- a) It is estimated that the time required for this project should be approximately 24 months.
 - Deadline for submission of phase I report (6 months from Notice to Proceed)
 - Deadline Phase 2 work (Start approximately 8 months after Notice to Proceed)
 - Deadline for submittal of DFR (20 months from Notice to Proceed)
 - Deadline for submittal of eight copies of the Final Report (24 months from Notice to Proceed)
- b) The cost for this work is estimated to be \$85,000. This Project would be funded at \$35,000 for Phase 1 in FY14 and if authorized to proceed, Phase 2 would be funded at \$50,000 in FY15.

VII. Implementation

- a) The proposed project is expected to make improvements to the performance of Precast Concrete Box Girders by eliminating reflective cracking between box sections.
- b) Provide recommended changes/additions to the WisDOT Bridge Manual indicating updated Policy on use of Precast Box Girders, Providing Design Guidance, and providing updated Standard Detail Drawings.
- c) Provide guidance in the Construction and Materials Manual related to proper construction techniques and inspection of Precast Box Girder Super Structures.
- d) Recommend changes to WisDOT's Standardized Special Provisions (STSP's) for Prestressed Box Girders.